THE EFFECTS OF UTILITY VALUE AND CHOICE ON INTEREST AND LEARNING IN ONLINE CLASSES

by

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STATEMENT OF THESIS APPROVAL

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ABSTRACT

As part of the Regulating Motivation and Performance Online Project (RMAPO) students completing an online HTML programming lesson demonstrated higher quiz scores and greater post lesson interest when initially provided information about how the skills could be used (personal or organizational applications). These effects were mediated by higher levels of engagement with optional examples and exercises during the lesson. The present paper examined the effects of adding utility value to optional example and exercises rather than to the initial lesson description. Additionally, some participants were allowed to choose which type of utility value they would like the examples and exercises to illustrate. Results replicated previously found results suggesting that higher levels of engagement with the examples and exercises lead to greater interest and learning at the end of the lesson. Unlike previous findings, the addition of utility value to the examples and exercises did lead to higher levels of engagement, interest, or learning. There were also no main effects of choice predicting engagement, interest, or learning. Results suggest a moderating effect of choice on higher level engagement behaviors predicting interest and quiz score, a moderating effect of choice on utility value type on interest, as well as a moderating effect of utility value type on lower level engagement behaviors predicting interest.

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INTRODUCTION

Recent technological advances make it possible for an increasing number of students to supplant the traditional college classroom with an often, more convenient option: the online course. This option has become increasingly popular in recent years, as these courses are designed to allow students to study and submit assignments whenever and wherever they want; they seem ideal for students who don't necessarily have the luxury of adapting their personal schedules to class schedules. According to the Sloan Consortium's 2007 study of online teaching in U.S. higher education, nearly 3.5 million college students were enrolled in at least one online course in the Fall of 2006. This was almost 20% of all students enrolled in college courses, and showed an increase of 1.1 million students enrolled in an online college course from fall of 2004 (Allen and Seaman, 2007).

It was also reported that nearly two thirds of U.S. higher education institutions currently offer online courses, with many of those offering full online degrees. Although adoption of online courses is becoming more mainstream, there are still several barriers chief academic advisors see as blocking a wider adoption of this facet of learning. For instance, over 80% of the chief academic advisors surveyed felt that students needed more self discipline to succeed in online courses compared to traditional courses, and that this was one of the toughest barriers to cross for online courses to be fully implemented.

Accordingly, self-regulation seems to be an important mechanism for successful students in online courses. Although the wealth of information that accompanies an online course can be helpful in promoting interest in the course (Sansone, Smith, Thoman and MacNamara, in preparation), it might also lead to behaviors that could be incongruent with the retention of core course material (Garner, Gillingham and White, 1989; Harp and Mayer, 1998), ultimately leading to lower performance. However, Cordova and Lepper (1996) and Parker and Lepper (1992) found that enhancing a computer task with self-relevant information, or adding a fantasy element to the task increased interest as well as task performance. The Self-Regulation of Motivation Model (SRM) (Sansone and Smith, 2000; Sansone and Thoman, 2005) provides a framework for how this tradeoff between interest and performance might function, and it is this model which guides the current research questions.

Many models of self-regulation (e.g. Elliot and Harackiewicz, 1996; Harackiewicz and Sansone, 1991; Vallerand, 1997) include goals as a construct of motivation, in that individuals engage in behaviors in order to achieve some important outcome. Depending on how much the individual values the outcome they are trying to achieve, and how likely they think they are to succeed (Eccles, 1983), the degree of motivation will either be high or low. The greater the individual's motivation to succeed, the greater their task persistence will be.

The SRM Model proposes interest as a key factor in maintaining motivation (see Figure 1). Interest plays a distinct role in the process of motivation, and it is therefore critical that it be distinguished from similar (but different) constructs (such

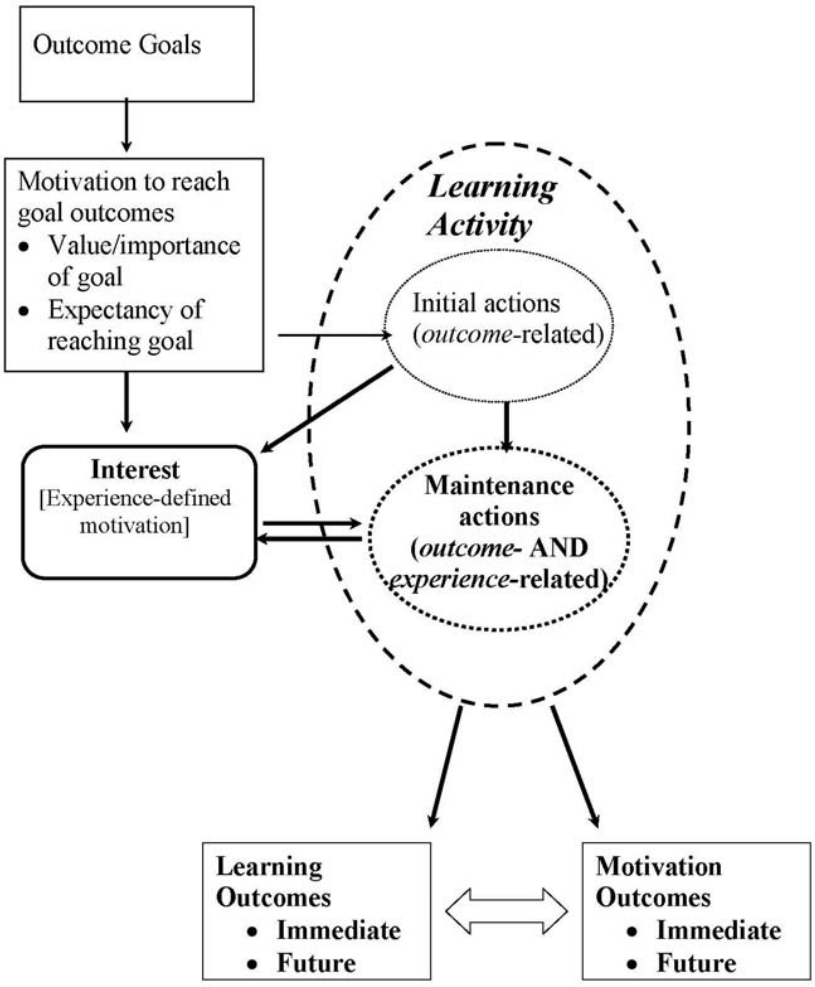

Figure 1. The SRM Model

as value of the goal, or general mood state). For example, when engaged in an interesting task, individuals learn more quickly, choose that task more often over others, and persist in that task for longer periods of time (Alexander, Jetton and Kulikowich, 1995; Lepper and Henderlong, 2000). Furthermore, when the performance of a task is motivated by individual interest, individuals think about the task more after the task has been completed, or if the task is interrupted, and will practice the task skills by choice (Krapp and Fink, 1992; Renninger, 2000).

The SRM Model suggests that initial goals are important when we begin any activity, but that the motivation to continue that activity once it has been started is an important part of reaching goals associated with the completion of the activity. For example, a student could begin studying for an online course exam with the goal of getting a good grade (goals oriented motivation) and might also find the test material interesting, making it interesting to study (experience related motivation). The goal of getting a good grade and the interesting material are working in the same direction to keep the student engaged in the test material. On the other hand, the student might not find the material very interesting. In this case, the SRM Model suggest that if the goal of getting a good grade is important enough to the student, behaviors to enhance motivation to reach a goal (i.e., reminding oneself about the importance of getting a good grade (Wolters, 1999; Wolters, 2003)) or behaviors to make studying the material more interesting (exploring external links related to the course material) might occur in order to maintain motivation to keep working on the material. Thus, goals oriented motivation and experience oriented motivation can work together, against one another, or they can be interrelated over time (e.g., Lepper, Greene, and Nisbett, 1973; Parsons, Adler, and Meece, 1984; Sansone and Smith, 2000). It is in the latter case (when goals oriented motivation and experience related motivation are interrelated over time) that tradeoffs between interest and performance might occur.

Sansone, Weir, Harpster and Morgan (1992) demonstrated this tradeoff by having students in a lab perform a boring task. When students were told that certain health benefits were associated with performing the task, they were more likely to alter the task in ways that made the task more interesting. Although this behavior

was associated with lower task performance in Sansone, et al. (1992), in a subsequent study, it was also associated with greater persistence in performing the task (Sansone, Wiebe and Morgan, 1999). The strategy of increasing interest by modifying the way a task is performed seems to be particularly relevant in the way students in online courses self-regulate their study behaviors. Online classes provide the option for students to access examples, videos, chat rooms, and external links to make studying more interesting, but as was illustrated above, these same behaviors can be associated with greater risk for certain performance tradeoffs to occur.

Additional studies (Sansone, et al., 2009) have found that students who reported exploring online links for the purpose of making studying more interesting also reported greater interest in class topics at the end of the semester. However, these students also earned lower midterm grades than students who did not report exploring external links. These results were particularly true for students who came into the course with the initial goal of getting a good grade (as compared to students who came into the course with the goal of learning about psychology). This suggests that the tradeoff between performance and interest might occur most often in situations where a person is initially developing interest in an activity, and when a person's engagement in an activity is not initially directed by interest. Conversely, once interest is established in a domain, situational fluctuations in interest might be less important in terms of motivation (Hidi and Renninger, 2006).

The SRM model suggests that it is not just how the instructor designs an online course that is important in students' regulation of interest, but how the students' create their own experience of interest, as well as their own grade goals.

Online courses provide an environment where it might be possible for technology to recognize individual patterns in self-regulation (the choices they are making for themselves), and provide feedback in order to foster individual curiosity, while also directing students back to the main points of learning set up by the instructor.

An online class in introductory web design that is currently taught at the University of Utah (Creating Interactive Web Content) has been enriched with interactive examples and exercises designed to help students learn the course content and perform better on the assignments and tests. The instructor of the course was able to collect information detailing example and exercise use (which examples students accessed, amount of time accessed, experimenting with examples, etc.) and the results of this analysis suggest that many students are not taking advantage of the supplementary material designed to help them succeed in the course, and are only completing the explicitly required course work (assignments, quizzes, and exams) (Zachary, 1994; Zachary and Jensen, 2003). Thus, students have the choice to use the examples and exercises, but many are not making those choices. Is there a way to construct these choice options so that individuals are more motivated to use them? One possibility is to frame the choices in ways that make engaging in the optional material more interesting.

Many online courses offer examples and exercises (movies, games, interactive quizzes, etc.) during the course of the lessons, and students thus have the choice of whether to use the materials presented, or to continue on with the lecture and assignments. Zuckerman et al., (1978) found that when given a choice of which puzzles to solve, participants spent more time engaged in solving the puzzles than

when they were assigned which puzzles to solve. However, this study involved perceptions of choice, rather than actual choice, thus there were no differential consequences associated with choice. As illustrated by the self-reports in Sansone et al. (2009), sometimes the actual choices that students make that enhance interest come at the cost of learning what is required by the instructor. Is there a way to encourage students to make choices that will help them learn the required material in addition to making the experience more interesting?

Previous research suggests that interest can be enhanced when tasks seem more personally relevant (Cordova and Lepper, 1996; Williams, 1998). In the actual programming class, the lessons and the specific examples and exercises within the lessons are not systematically framed in a way that allows students to understand how the skills they are learning could be used in their own lives. The degree of personal relevance thus depends on students making the links themselves. This suggests that one way to make using the examples and exercises seem more interesting is to explicitly note the utility of what is being learned by illustrating how the material can relate to the students' lives.

This possibility raises a question, however, about what kind of "relevance" will be seen as more interesting. When students from the actual class were surveyed, they were asked which lessons they liked the most and the least, and why. Although students often cited the lesson's perceived utility for real life application as a reason why they liked a lesson, the type of application often varied. For example, for students who selected the lesson on constructing forms as the one they liked the most, reasons for that selection included general references to usefulness (e.g., "appeared

most useful in a real application"), as well as references to personal ("I'm trying to design my own website which includes a form") and work ("It helps give a professional feel to a website which helps consumers/users") applications. The question then is whether it matters *how* a lesson may be useful, or is it just important that it be perceived as having utility? Although having utility may contribute to more positive evaluations of the activity, how it is useful may change how students interact with the activity—and particularly, whether and how often they choose to use the optional examples and exercises.

In order to examine the effects of creating personally relevant lesson material, the choices that students make, and the behaviors associated with those choices (i.e., types of examples/exercises chosen to work with, level of engagement with examples/exercises) while working on an online lesson, the current study brings students into the lab to engage in an online lesson adapted from the introductory web design course. Using information gathered previously from students in the course that details which lessons were perceived as most enjoyable, we altered the ways the examples and exercises from those lessons were presented in order to facilitate personal use, or professional/organizational use.

To begin to examine these questions, we first worked to establish the laboratory analog of the online class, by distilling several different lessons from the online class into a 1 ½ hour lesson (Sansone, et al., 2010). The lesson was a modification of the very first lesson in the course (in order to provide some background to HTML programming) and a forms processing lesson that was one of the lessons found to be most enjoyable by students. We then examined whether

students chose to engage the examples and exercises within the online lesson differently as a function of their initial perceptions about how they could potentially use what they would learn in the lesson. In the neutral control condition, students read only about the HTML skills they would learn. In the personal orientation condition, the description of the same set of skills was framed in terms of learning for personal application (e.g., for creating personal web pages), whereas in the organization orientation condition, the description was framed in terms of learning for business and organization application (e.g., for creating professional web pages). The specific examples and exercises, in contrast, were neutral and identical across conditions. In this case, then, students might choose to engage the examples and exercises at a higher level in the application framing conditions not because the content of the examples and exercises became more personally relevant, but because the overall lesson was perceived as more relevant.

Results from this study suggest patterns of engagement specific to the initial orientation of the lesson. Participants who got either the initial personal application framing or the initial professional application framing were more likely to engage the examples and exercises at a higher level by modeling and by manipulating and then modeling the sample HTML code in the examples and exercises, compared to those who got the initial neutral framing. There were no differences between the two manipulations in regards to modeling or manipulating/modeling the examples and exercises. Results also showed that the initial manipulation of utility value indirectly and positively predicted interest and learning outcomes through this higher engagement with the examples and exercises. However, there was also a direct effect

on interest that was not mediated by engagement, such that individuals in the organizational framing condition reported greater interest than individuals in the personal framing condition. The latter finding may reflect that match with personal preferences can affect interest in and of itself.

These findings suggest that providing information to students at the onset of the lesson illustrating the relevance of what they will learn is related to the way that they interact with examples and exercises. However, because this study employed neutral examples and exercises that were kept constant through the conditions, we could not examine whether the effects of "adding relevance" would be similar when presented in the context of the examples and exercises.

In the current study, the initial orientations to the lessons were kept the same, but the framing of the specific examples and exercises was varied. In particular, I examined whether students choose to use the examples and exercises within the online lessons differently as a function of whether the examples and exercises themselves were framed in term of personal applications (e.g., this example will teach you how to post a picture of your family on your own website), business and organization applications (e.g., this exercises will teach you how to create an order form for a business' product), or were framed neutrally (this example will teach you how to organize text into rows and columns).

In addition, I included a comparison condition in which students had the opportunity to choose to have the examples and exercises framed in terms of personal or in terms of business and organization applications. The addition of this condition allowed me to examine whether these applications have similar effects

when students had a choice to select the one that was most relevant to them, as opposed to simply being provided examples and exercises framed in terms of personal or business and organization applications. This condition thus allows a beginning exploration of whether the potential provided by online learning for constructing individualized lessons does have an impact on students' choices while engaged, and on motivation and performance outcomes.

The research questions this study was designed to answer were threefold: 1) Will framing examples and exercises in terms of personal applications or business/organizational applications lead students to access and interact with examples and exercises more, as compared to examples and exercises that are neutral in regards to application? 2) Is there a particular type of application (personal or business/work related) that leads to greater accessing of, and interaction with, examples and exercises? Finally, 3) will students who are given the choice between working with personal or business/work related examples and exercises access and interact with the examples and exercises differently, compared to students who were *assigned* to work with the same examples and exercises?

Based on these questions I present two sets of hypotheses. In the first set, I will test whether the results found when utility value was manipulated at the beginning of the lesson are replicated when the added value information was conveyed in the differential framing of the examples and exercises throughout the lesson. If they are replicated, then participants who are assigned to work with either personal or organizational examples and exercises should engage the examples and exercises at a higher level than participants assigned to work with neutral examples

and exercises, and show greater interest and higher learning at the end of the lesson. If the results from Sansone, et al. are further replicated, the difference between the type of value (personal v. organizational web page applicability) may not emerge for engagement, but may emerge for interest. However, it is possible that because the framing of the examples and exercises are not held constant in the present study, differences in engagement with the examples and exercises by application type may emerge.

In the second set, I will test whether the type of framing (in terms of personal or organizational applications) has differential effects as a function of whether students chose the application as compared to being assigned to the application. I predict that participants who had a choice of which examples and exercises to use will engage the examples and exercises at a higher level than those who did not have that choice. Furthermore, choice might moderate the effects of application type, such that if differences by application type emerge, they will occur primarily when individuals are assigned to condition, not when they were able to choose the type that matches their preferences. Finally, as found previously, I predict that higher levels of behavioral engagement with the example and exercise would positively predict interest in the lesson and greater learning after completion, but that this relationship may become stronger when individuals are able to choose the type of application illustrated in the examples and exercises.

METHOD

Creating and piloting the examples and exercises

Students in an actual online HTML programming course reported that two of the main areas where learning HTML programming skills would be helpful would be for creating personal web pages or creating web pages for an organization or business. Thus, these were the utility value domains that we chose to employ in our manipulations of the framing of examples and exercises. The goal in creating the different versions of the examples and exercises was for the skill that was illustrated in each example and exercise to remain constant across conditions. However, the example of how one could use that skill would be particularly relevant to creating personal web pages or to creating organizational web pages, or would be a neutral framing used in the previous study.

After creating a set according to these guidelines, we had students ($N = 73$) in pilot testing rate the proposed examples and exercises in terms of how useful they would be for creating personal web pages and for creating organizational web pages. Descriptions of the examples and exercises were framed either personally (e.g., "An example that teaches you how to allow your family and friends to submit comments on a proposed holiday gathering via a text box on your website."), organizationally (e.g., "An example that teaches you how to allow employees to submit comments on a proposed advertising campaign via a text box on a website."), or neutrally (e.g.,

"An example that teaches you how to allow individuals to submit comments via a text box on a web site"). In an online survey, all participants read each set of nine example and exercise descriptions for neutrally oriented, personally oriented, and organizationally oriented examples and exercises, for a total of 27 descriptions. The descriptions were presented in the same random order to each participant.

After reading each description participants rated it in terms of how applicable it would be to creating personal and to creating organizational web pages. They also rated how interesting they thought the example would be, and how difficult they thought it would be. All ratings were made on a 1 (not at all applicable, interesting, difficult) – 5 (very applicable, interesting, difficult). Mean scores for personally, organizationally, and neutrally framed examples and exercises, respectively, were calculated by averaging the ratings from the nine different example/exercise descriptions for each example/exercise type.

A paired-samples t test of these pilot data revealed that personally framed examples and exercises were rated as significantly more applicable for creating a personal web page ($M = 4.2$) than for creating an organizational web page ($M = 2.7$) ($t(69) = 11.73$, $p = .00$, $SE = .12$). Conversely, organizationally framed examples and exercises were rated as significantly more applicable for creating an organizational web page ($N = 4.7$) than for creating a personal web page ($M = 2.4$) ($t(69) = -18.40$, $p = .00$, $SE = .12$). Although these means suggest that each type of example and exercise description was more applicable to its matching domain than the other, the data also suggest that the organizational examples/exercises may seem more applicable for building an organizational webpage than the personal

examples/exercises seem for building a personal webpage. Again, a paired samples t test comparing the applicability of the examples and exercises for each domain showed that this difference was significant ($t(68) = -8.54$, $p = .00$, $SE = .06$). However, both the mean applicability ratings for personal and organizational web pages (when matched to their appropriate description) were above the scale midpoint indicating that each domain of examples and exercises was rated as applicable for building the type of web page that matched the description.

Additionally, a paired-samples t test showed that neutrally framed examples and exercises were differentially rated as being applicable for creating an organizational web page ($M = 4.4$) and for creating a personal web page ($M = 4.1$) ($t(67) = -7.42$, $p = .00$, $SE = .05$). Although there was a significant difference between the applicability of the neutral examples and exercises for organizational and personal web pages, mean ratings for each were above the midpoint of the scale, and so the neutral examples and exercises were perceived as being applicable to each domain.

For interest and difficulty ratings, results from a repeated-measures ANOVA revealed that there did not seem to be differences in how interesting participants thought the different types of examples and exercises would be ($F(2, 122) = .2.24$, $p = .11$), however there was a significant difference in how difficult participants thought the different types of examples and exercises would be ($F(2, 130) = 18.28$, $p = .00$). Upon further examination of the means, it appeared that the organizationally framed examples and exercises ($M = 2.44$) were perceived as being more difficult

than the neutrally framed (M = 2.21) or personally framed (M = 2.18) examples and exercise, although the skills illustrated were actually the same.

Finally, participants were asked to consider whether it would be more important for them to learn HTML programming for creating personal or for creating organizationally related web pages if they were taking an HTML programming course. This question was asked in order to see which application would be more important for participants, and possibly which application may be chosen more often in the choice condition of the main study. Sixty three percent of pilot participants reported that it would be more important for them to learn HTML programming for building a business/organizational web page than a personal web page.

Results from piloting thus confirmed that the neutrally framed examples and exercises had the potential to apply to personal or organizational web pages, but that the personally framed examples and exercises were seen as applicable primarily to personal web pages, and the organizationally framed examples and exercises were seen as applicable primarily to organizational web pages. The differential framing did not correspond to perceiving the examples and exercises as differentially interesting, but the organizationally framed examples and exercises were seen as slightly more difficult than the same examples and exercises framed in terms of personal or nonspecific applications.

Participants

Participants (N = 154, 69% female, mean age = 24.6) enrolled in the main study in order to receive credit for their psychology course. They were randomly assigned to one of four conditions (neutrally framed examples/exercises, personally

framed examples/exercises, organizationally framed examples/exercises, or choice between working with either personally framed or organizationally framed examples/exercises). These participants were expected to represent the population of college students who might enroll in at least one online class during their college career (Allen and Seaman, 2007).

Procedure

A brief description was posted on the undergraduate Psychology subject pool explaining the study as a chance to help researchers improve online learning by working on and evaluating an online HTML programming lesson. Participants who were interested signed up for the study and were contacted by a research assistant via email and asked to fill out an online survey prior to coming into the lab. The online survey consisted of background and individual difference measures, which will be discussed later. Once participants completed the online survey they were asked to sign up for a specific date and time to complete the in person portion of the study.

Upon arrival at the lab, participants found what appeared to be a multipurpose computer lab, similar to other student use computer labs one campus. Separate workstations and computers near the back of the lab were divided by partitions and allowed up to four participants to be working simultaneously, although individually. Participants were greeted by a research assistant disguised as a "lab attendant" who worked at a desk near the front of the lab. The participant was asked to sign in for the proper experiment, after which the research assistant assigned them a computer and workstation. Participants were told that the "lab attendant" could not help them with specific questions they might have about the study, as they were not

involved with the study, but simply worked in the computer lab; although they could help should problems arise with the computer (e.g., the computer froze, or the participant exited the lesson on accident). Participants were then instructed that they could take short breaks in order to use the bathroom or get a drink if needed, but that if they did leave their computer to be sure to place a "Computer in use" sign (found by the side of their screen) in front of their computer so that someone else did not come in and take their spot. The research assistant then started the pre lesson questionnaire for the participant and the rest of the instructions for the study appeared on the computer screen. After starting the pre lesson survey, the research assistant went back to his or her desk behind a partition.

After being left alone at the computer, all participants read a message describing the study. Participants were reminded that they would be working on an online lesson and providing feedback in order to help improve the quality of online learning at the university. Participants were told that they would have 90 minutes to work on the lesson and assignment, after which the post lesson evaluation would appear. Finally participants were reminded that they were allowed to take short breaks to visit the restroom or to get a drink if needed, but that they should remember to place the "computer in use" sign in front of their monitor in order to insure that someone did not come in and start using their computer.

After reading this message, participants were directed to a second page of instructions that introduced the HTML lesson. At this point participants were presented with one of four different messages that constituted our conditions. Participants in the neutral condition were simply told the examples and exercises in

the lesson would illustrate how they could apply the basic HTML skills that they were about to learn. Participants in the added utility value conditions (organizational/business and personal) were told that the examples and exercises in the lesson would illustrate how they could apply basic HTML skills to an organization's or a business' webpage (organizational condition) or their own personal webpage (personal condition), respectively. Participants in the choice condition were told that the examples and exercises would illustrate either how the skills could be applied to organizational applications or how the skills could be applied to personal applications, and then were asked to choose which set they would like to work with. Once participants clicked on the button marking their choice, the software then automatically directed them toward the same lesson materials that those assigned to work with organizational or personal web page applications had access to.

When participants had finished reading the manipulation page, they were then directed to a pre lesson questionnaire. The questionnaire consisted of two main parts. They first completed a quiz about the instructions they had just read. Questions helped to emphasize certain aspects of the instructions we wanted to make sure participants did not miss (e.g., questions assessing time limit, which types of examples/exercises they would be working with). Participants in the choice condition only were asked which type of application they had *chosen* the examples and exercises to illustrate. If participants answered any of these questions incorrectly, they were asked to answer the question again to insure that they understood the instructions. Finally participants were asked to complete a short questionnaire

assessing their initial expectations for the lesson (e.g., anticipated interest, anticipated difficulty, etc.) Upon completion of this questionnaire, the questionnaire page closed and the lesson was launched. Participants had 90 minutes total to read the instructions and complete the lesson and the lesson assignment.

The introduction to HTLM programming lesson that was used was adapted from several lessons that students in the actual HTML programming class found most helpful and interesting. Sections teaching different skills such as text positioning, table creation, inserting images and hyperlinks, creating textboxes, and creating forms were included. These concepts were presented on the main lesson page that participants were expected to read, as well as in the interactive examples and exercises that students could use if they chose to do so.

The examples and exercises could be accessed by clicking on a button positioned on the main lesson pages, and would open up in a new window. Alongside the button, a description of the examples or exercise was posted (e.g., "Click here to see an example that teaches you how to display a picture of your family on a webpage"). Upon opening up the examples, participants saw sample HTML code that they had read about on the main lesson page, along with content information that matched the condition they were in. Participants could then click on another button that would open up a new window and model the actual webpage that the sample code would create. Further, participants had the option to manipulate the sample code, and then model the changes to see how they affected the way the webpage looked. If participants made any errors in their coding when they modified the sample code, an error message would appear to let them know exactly where they

had gone wrong. Participants could then fix the error and try to model again. Examples were available for each different concept taught in the lesson, however participants had the option of whether or not to use the examples, and further, how much they wanted to engage the examples.

Measures

Measures to control for background and individual differences

In order to account for participants' prior experience with web design and computer programming, they were asked in the online survey prior to coming into the lab to indicate to what extent they had previously worked within each domain. Participants rated their experience with HTML programming one a 1 (no prior experience) to 4 (have created web pages professionally in HTML) scale. Participants also rated their experience with computer programming in general on a 1 (no prior experience) to 4 (have programmed computers professionally) scale. Findings by Fraughton, et al., (in press) found that prior experience with HTML programming negatively predicted higher levels of lesson engagement, and thus background experiences were potentially important factors to consider in our analyses.

Participants in the online survey were also asked to rate how interesting and separately how important they thought it would be for them to use HTML programming for creating personal as well as organizational web pages on 1 (not at all interesting; important) to 5 (very interesting; important) scales. These measures were included as possible predictors of why participants assigned to the choice condition may have made the selection they did.

Manipulation checks

After reading the initial description of the lesson and the examples and exercises, participants were asked to identify the application the examples and exercises they were going to be working with would illustrate. Participants in the neutral condition were asked the following question: "The examples and exercises will illustrate which of the following applications?" They were asked to pick the correct answer from the following options: A) Applications for analysis of literary texts, B) Applications for HTML programming, or C) Applications for maintaining healthy heart function. Participants in the value added conditions were asked the following question: "Which of the following applications of HTML skills will be illustrated by the available examples and exercises?" They were asked to pick the correct answer from the following options: A) Applications for creating your own personal webpage, B) Applications for creating a webpage for an organization or business, or C) Applications for creating a webpage for a school project. Finally, participants in the choice condition were asked the following question: "Which of the following applications of HTML skills did you choose for the available examples and exercises?" They were asked to pick the correct answer from the same options available to those assigned to the value added conditions. If participants incorrectly answered this question, they were told that they had answered it incorrectly, and were asked to answer again until they identified the correct answer. This ensured that participants were aware of the types of examples and exercise they would be working with.

Initial expectations

These questions served as initial assessments of interest ("How interesting do you think this lesson will be?"), anticipated difficulty ("How difficult do you think the lesson will be?"), anticipated performance on the task ("How well do you think you will do on this task?"), competence value ("How important is it for you to do well on the lesson today?"), utility value ("How useful do you think learning the material in this lesson will be?"), the personal importance of learning the information ("How important is it to you to learn the material in this lesson?"), as well as how autonomous they felt about working on the lesson ("Working on this lesson is something I wish to do"). These items were assessed using a 1 (not at all/none at all) to 5 (very much) scale. These questions were used in order to assess whether or not the condition manipulations created different lesson expectancies (see Ainley and Patrick, 2006; Harackiewicz, 1979; Sansone, 1986 for discussion of reliability and validity of these one item measures).

Lesson engagement behaviors

We assessed use of the optional examples and exercises in three different ways. At the first level, we assessed the number of times that participants simply accessed the examples or exercises across the entire lesson (Degree Accessed; scores ranged from 1 to 57). Once participants opened the example or exercise window, they then had two further options. They could click on a "model" button that would open a second window showing how the sample code affected the web page, and/or they could click on the "change" button that would open a second window allowing them to manipulate the sample code and model the effects of those changes on the

web page. As a measure of the second or mid level of engagement, therefore, we assessed the number of times that participants clicked on the "model" button across the entire lesson (Degree Modeled; scores ranged from 0 to 34). As a measure of the third and highest level of engagement, we assessed the number of times that participants clicked on the "change" button across the entire lesson (Degree Manipulated/Modeled; scores ranged from 0 to 62). Measurement of these behaviors allowed us to determine whether or not different conditions elicited different lesson behaviors. We were also be able to examine whether or not participants who used the examples and exercises more showed differences in interest, performance, and learning, compared to those who did not use the examples and exercises as often.

Outcomes

Interest

Interest in the lesson after completion was assessed by participants' ratings of agreement with five items using a 5 point scale ranging from *strongly disagree* to *strongly agree* (e.g., "I would describe this lesson as very interesting"; alpha = .92).

Learning

A short multiple choice quiz was given after the lesson had closed. The quiz was comprised of questions dealing with specific concepts and problems that had been taught in the lesson (e.g., "what happens when you place a <BR> tag at the end of a line of text?", "How many rows in a table will the following line of code create?"). These questions were drawn from questions used in an actual online HTML course, but we took care to ensure that each question corresponded to points

brought up in the laboratory lesson. Participants had the chance to score up to 27 points on this quiz.

RESULTS

Preliminary analyses

Randomization check

Participants were randomly assigned to one of four conditions (Neutral, Assigned Personal, Assigned Organizational, and Choice of Personal or Organizational). In the screening questionnaire completed online prior to coming into the lab, individuals had previously rated how important and, separately, how interesting, they thought it would be to learn HTML programming for creating personal web pages and for creating organizational web pages. They also separately reported their prior experience in creating web pages and in computer programming. In order to test for successful randomization of participants to condition in terms of their background interest and experience with HTML and computer programming, I performed multiple one way ANOVAs using conditions as a between subjects factor (see Table 1).

Results suggested differences between conditions in how interesting participants thought it would be to learn HTML programming for creating personal web pages ($F(3, 144) = 2.87$, $p = .04$), indicating a partial failure of randomization. Examination of the mean ratings suggested that participants assigned to the Neutral condition came into the study with higher individual interest in personal webpage

Table 1

Descriptive statistics for previous experience and individual interest/importance measures as a function of condition (randomization check)

Background and Individual Differences		Conditions (Assigned) Neutral (*N*= 37)	Assigned Pers. Orientation (*N* = 39)	Assigned Org. Orientation (*N* = 35)	Choice Conditions (*N* = 43)
Prior HTML Experience	Mean	1.57	1.54	1.62	1.67
	SD	.70	.70	.82	.77
Prior Computer Programming Experience	Mean	1.43	1.19	1.54	1.35
	SD	.87	.52	.85	.75
Interest in Pers. Web pages	Mean	3.35	2.73	2.53	2.74
	SD	1.34	.99	1.39	1.29
Interest in Org. Web pages	Mean	3.32	2.81	2.75	2.83
	SD	1.33	1.08	1.57	1.17
Importance of Pers. Web pages	Mean	3.00	2.38	2.49	2.26
	SD	1.35	1.26	1.27	1.20
Importance of Org. Web pages	Mean	3.19	2.70	2.91	2.84
	SD	1.22	1.24	1.31	1.25

Table 1 Continued

Note: Scores for prior HTLM experience and prior computer programming experience ranged from 1(no prior experience) – 4 (designed webpages professionally using HTML); scores for interest in and importance of learning HTML programming for designing personal and organizational webpages ranged from 1 (not at all interesting/important) – 5 (very interesting/important).

applications for HTML programming, compared to participants randomly assigned to the other three conditions. There were no significant differences between conditions for any of the other variables tested. This uneven distribution of interest for creating personal webpages across conditions could possibly account for any effects or lack of effects between the neutral condition and the added value conditions, and this possibility is examined below.

Participants' choices

Forty three participants were randomly assigned to the condition where they were allowed to choose whether the example and exercises during the lesson illustrated personal or organizational web page applications. Of the 43 participants, 27 (63%) chose to have access to personal web page application examples, and 16 (37%) chose to have access to organizational web page application examples. Participants in this condition only were subsequently asked (prior to beginning the lesson) which type of examples and exercises they had chosen and all participants correctly reported the application that matched their choice on the first try.

I examined whether background characteristics in interest and importance of learning HTML for creating personal and organizational web pages predicted individuals' choices. I regressed each of these four variables (important/personal web page; important/organizational web page; interesting/personal web page; and interesting/organizational web page) on individuals' choices (coded 1 for personal, -1 for organizational). Only ratings of how interesting they thought it would be to learn HTML programming to create organizational web pages was significant, such that

higher interest was associated with having later chosen to work with organizationally framed examples and exercises. ($t(41) = -2.84$, $p = .01$, $b = -.48$.

I also examined whether reported background experience creating web pages and in computer programming predicted individuals' choice to have access to personal or organizational web page examples. Results suggested that participants with more computer programming experience were more likely to have chosen to work with organizational examples and exercises ($t(41) = -2.40$, $p = .02$, $b = -.48$), whereas participants with more reported experience creating web pages were more likely to have chosen to work with personal examples and exercises ($t(41) = 2.63$, $p = .01$, $b = .46$). Together, these preliminary results suggested that participants were more likely to choose to have access to examples and exercises framed in terms of personal rather than organizational web page applications, except when they had previously indicated greater interest in learning applications for organizational web pages or reported greater computer programming experience.

Expectations prior to the lesson

Before participants began the lesson, but after the introduction of the example/exercise framing and choice manipulations, participants rated the anticipated difficulty, their anticipated performance compared to other students, and their anticipated interest. They also rated anticipated value in three different ways: anticipated usefulness, personal importance of learning the material, and personal importance of doing well. Additionally, participants reported the degree to which working on the lesson was something that they wished to do (autonomy). Results from multiple oneway ANOVAs using condition as the between subjects factor

indicated no significant differences as a function of condition for any of these variables. Means are reported in Table 2. These results suggest that participants all went into the lesson with the same expectations, regardless of which condition they were in. In contrast to the results in Sansone et al., therefore, knowing that the examples and exercises would be framed in terms of personal or organizational applications did not lead participants to anticipate that learning HTML would be more useful, as compared to participants in the neutral framing control.

Outlier analyses

Finally, several extreme scores for example/exercise use, example/exercise manipulate/model, and quiz score were identified in several conditions. In order to be sure that the results reported were not influenced by these outliers, the models described below were run a second time with these scores excluded from the data set. No different effects were found when these scores were excluded. Because we had no reason to remove these scores from the main analyses (e.g., reason to believe that these participants were different from the rest), analyses for the results reported included all data.

Main analyses overview

Two sets of regression models were created in order to test the main hypotheses (see Table 3). The first model (Replication Contrasts model) included two contrast codes for the manipulation of utility value that replicated the model tested in Sansone et al: *Value added vs. No value added* and *Personal* (*assigned) vs. Organizational* (*assigned) Value*.

Table 2

Descriptive statistics for pre lesson measures as a function of condition

Pre Lesson Measures		Conditions (Assigned and Chosen)				
		Neutral (N = 37)	Assigned Pers. Orientation (N = 39)	Assigned Org. Orientation (N = 35)	Choice Pers. Orientation (N = 27)	Choice Org. Orientation (N = 16)
Anticipated Difficulty	Mean	2.95	3.28	3.14	3.07	3.19
	SD	0.88	0.759	0.97	0.83	0.98
Importance of doing well	Mean	3.00	2.64	3.03	2.96	3.06
	SD	1.13	1.16	0.89	1.13	1.29
Anticipated Interest	Mean	3.19	2.97	3.11	3.04	2.88
	SD	1.10	0.78	1.05	1.02	1.15
Importance of Learning the Material	Mean	3.08	2.72	3.00	2.7	3.13
	SD	1.06	0.86	1.11	1.27	1.09
Anticipated Usefulness	Mean	3.41	3.18	3.43	3.11	3.38
	SD	1.04	0.68	0.98	1.16	1.26

Table 2 Continued

Pre Lesson Measures		Neutral (N = 37)	Assigned Pers. Orientation (N = 39)	Assigned Org. Orientation (N = 35)	Choice Pers. Orientation (N = 27)	Choice Org. Orientation (N = 16)
Autonomy	Mean	3.14	2.90	3.23	3.00	2.94
	SD	1.16	1.14	1.00	1.18	1.18
Anticipated Competence	Mean	3.08	2.95	3.09	2.85	2.81
	SD	0.80	0.65	0.85	1.03	1.33

Note: Scores for anticipated difficulty, importance of doing well on the less, anticipated interest in the lesson, importance of learning the material in the lesson, anticipated usefulness of the lesson material, feelings of autonomy, and anticipated competence with lesson material ranged from 1 (not at all) – 5 (very much).

Table 3

Main effects and interaction contrast codes for all conditions

REPLICATION CONTRASTS MODEL					
Orthogonal Contrasts	No Value Added	Assign Pers.	Assign Org.	Choice Pers.	Choice Org.
Personal (Assigned) vs. Organizational (Assigned)	0	1	-1	0	0
Value Added (Assigned) vs. No Value Added	-2	1	1	0	0
CHOICE AND VALUE TYPE CONTRASTS MODEL					
Main Effect Contrasts					
Personal (Assigned and Chosen) vs. Organizational (Assigned and Chosen)	0	1	-1	1	-1
Assigned (Personal and Organizational) vs. Chosen (Personal and Organizational)	0	-1	-1	1	1
Interaction Contrast					
Personal vs. Organizational by Assigned vs. Chosen	0	-1	1	1	-1

The difference from Sansone et al. is that in the present study, the added value information was conveyed in the differential framing of the examples and exercises throughout the lesson, rather than in statements that appeared differentially only at the beginning of the lesson material. Outcomes (e.g., post lesson interest and quiz score) and lesson engagement behaviors (degree accessed, modeled, and manipulated/modeled the sample HTML code in examples and exercises) were regressed on this model to examine whether similar results obtained when the framing occurred throughout the lesson rather than only at the beginning.

The second model (Choice and Value Type Contrasts model, see Table 3) examined whether the type of framing (in terms of personal or organizational applications) had differential effects as a function of whether students chose the application as compared to being assigned to the application. This model thus included two main effect contrast codes: *Assigned* (*personal and organizational) vs. Chosen* (*personal and organizational*) and *Personal* (*assigned and chosen) vs. Organizational* (*assigned and chosen)*. The model also included the interaction between the two main effect contrasts. Outcomes (e.g., lesson interest and quiz score) and lesson engagement behaviors (e.g., degree accessed, modeled, and manipulated/modeled the sample HTML code in examples and exercises) were regressed on this model in order to examine whether or not being allowed to choose which types of examples and exercises participants got to work with had any effects. Condition means and SDs for the three levels of engagement behaviors and two outcome measures are presented in Table 4.

Table 4

Descriptive statistics for behavioral engagement and outcome measures (*lesson interest and quiz score)*

		Conditions (Assigned and Chosen)				
Engagement Behaviors and Outcome Measures		Neutral (N = 37)	Assigned Pers. Orientation (N = 39)	Assigned Org. Orientation (N = 35)	Choice Pers. Orientation (N = 27)	Choice Org. Orientation (N = 16)
Example/Exercise Access	Mean	24.73	24.00	21.40	25.63	25.81
	SD	12.69	8.60	9.32	9.08	7.86
Example/Exercise Model	Mean	12.46	13.23	10.83	13.63	12.00
	SD	6.89	8.49	8.32	9.91	6.98
Example/Exercise Manipulate/Model	Mean	22.81	19.33	19.17	16.63	21.50
	SD	17.34	15.17	14.25	14.76	16.31
Post Lesson Interest	Mean	15.19	14.21	14.91	14.85	12.75
	SD	5.067	5.07	5.65	4.87	4.81
Quiz Score	Mean	17.32	16.62	16.66	16.59	17.25
	SD	2.85	2.39	2.83	2.53	2.29

Note: Scores for number of times example/exercises were accessed ranged from 1 – 57; number of times examples/exercises were modeled ranged from 0 – 34; number of times examples/exercises were manipulated/modeled ranged from 0 – 62; composite scores for interest (from 5 different questions assessing interest) ranged from 5 – 25; quiz scores ranged from 11 – 24.

Relationships between engagement behaviors and outcomes

After testing whether the two contrasts models predicted outcomes (quiz score and lesson interest) or engagement behaviors (degree accessed, modeled, and manipulated/modeled), I then examined the relationship between engagement behaviors and the outcomes. Sansone, et al. (2010) found that mid and higher level engagement behaviors (e.g., degree modeled and manipulated/modeled) positively predicted quiz scores and lesson interest regardless of condition. As mentioned earlier, the actual example/exercises did not differ between conditions in the earlier study, and so that may be one reason that condition did not moderate the relationship between engagement behaviors and the outcome measures. In the present study, however, the examples and exercises were either neutrally oriented (similar to the examples and exercises in the previous study), or they were framed in terms of personal or organizational web page applications. Because this different content throughout the lesson may moderate effects of example/exercise engagement on interest and quiz score, I added to the two models described in Table 3 the main effects (centered) of each of the measures of engagement as well as the interactions between each of these measures and the contrasts included in the models (Replication Contrasts plus Engagement Behaviors model and Choice and Value Type Contrasts plus Engagement Behaviors model, respectively).

Model testing for outcomes

Do added value or value type (assigned) predict outcomes?

Lesson interest and Quiz Scores were each regressed on the Replication Contrasts model. The overall models were not significant for either outcome (Lesson Interest, $F(2, 151) = .36$, $p = .70$, $R^2 = .01$; Quiz Score, $F(2, 151) = .86$, $p = .42$, $R^2 = .01$), and neither contrast was individually significant in either model. These results indicated that adding value information by framing examples and exercises in terms of potential applications to personal or organizational web pages did not positively affect either outcome, in contrast to the findings of Sansone, et al.

Do choice and value type predict outcomes?

Lesson Interest and Quiz Score were next each regressed on the Choice and Value Type Contrast model. The model was not significant for either outcome (Lesson Interest, $F(3, 150) = .64$, $p = .59$, $R^2 = .01$; Quiz Score, $F(3, 150) = .39$, $p = .76$, $R^2 = .01$), and there were no individually significant effects in either regression. These results indicated that having choice of which type of application would be reflected in the examples and exercises did not affect outcomes either directly or in interaction with type.

Model testing for engagement behaviors

Do added value or value type predict engagement?

The degree to which the participants accessed the examples and exercises, the degree to which they modeled the sample HTML code, and the degree to which they manipulated and then modeled the sample HTML code were each regressed on the

Replication Contrasts model. None of the overall models were significant ($F(2, 151) = 1.08$, $p = .34$, $R^2 = .01$ (for access), $F(2, 151) = .80$, $p = .45$, $R^2 = .01$ (for modeling), and $F(2, 151) = .66$, $p = .52$, $R^2 = .01$ (for manipulate/modeling)), and there were no individually significant effects. Unlike Sansone, et al.'s findings, the added value information was not associated with greater engagement.

Do choice and value type predict engagement?

The degree to which the participants accessed the examples and exercises, the degree to which they modeled the sample HTML code, and the degree to which they manipulated and then modeled the sample HTML code were next regressed on the Choice and Value Type Contrasts model. None of the models reached significance ($F(3, 150) = 1.27$, $p = .29$, $R^2 = .02$ (for access), $F(4, 149) = .78$, $p = .51$, $R^2 = .02$ (for modeling), and $F(5, 148) = .42$, $p = .74$, $R^2 = .01$ (for manipulate/modeling)), and there were no individually significant effects for any of the engagement behaviors. This suggests that participants did not engage the examples and exercises any differently whether they were assigned which ones to work with, or whether they were allowed to choose which ones to work with.

Do engagement behaviors predict outcomes?

Previous findings suggested that the way participants engaged the examples and exercises predicted how well they performed on the quiz, as well as how interested they reported they thought the lesson was upon completion. Even though in the present study the conditions did not affect the patterns of engagement, it was important to test whether the relationships between engagement behaviors and the

outcome measures (quiz scores and interest) were similar to those found previously. I also tested whether in the present study these relationships were moderated by condition, as reflected in the set of contrasts.

Quiz score.

When quiz score was regressed on the Replication Contrasts plus Engagement Behaviors model, the overall model was significant ($F(11, 142) = 5.80$, $p = .00$, $R^2 = .31$). The degree to which participants modeled ($t(142) = 1.96$, $p = .05$, $b = .06$, $SE = .03$) and manipulated/modeled ($t(142) = 5.24$, $p = .00$, $b = .07$, $SE = .01$) the sample HTML code significantly and positively predicted quiz score. There were no significant main effects or interactions involving the replication contrasts.

When quiz score was regressed on the Choice and Value Type Contrasts plus Engagement Behaviors model, the overall model was significant ($F(11, 142) = 6.25$, $p = .00$, $R^2 = .33$). Similar to the findings just reported, both degree modeled and degree manipulated/modeled positively predicted quiz score. There was also a significant interaction between the degree to which participants manipulated/modeled the sample HTML code and the Assigned (personal and organizational) vs. Chosen (personal and organizational) contrast ($t(142) = -2.06$, $p = .04$, $b = -.03$, $SE = .02$), suggesting that the positive effect of manipulating/modeling sample HTML code on quiz score was especially true for participants who were assigned to which type of application in the examples and exercises they would have access (see Figure 2).

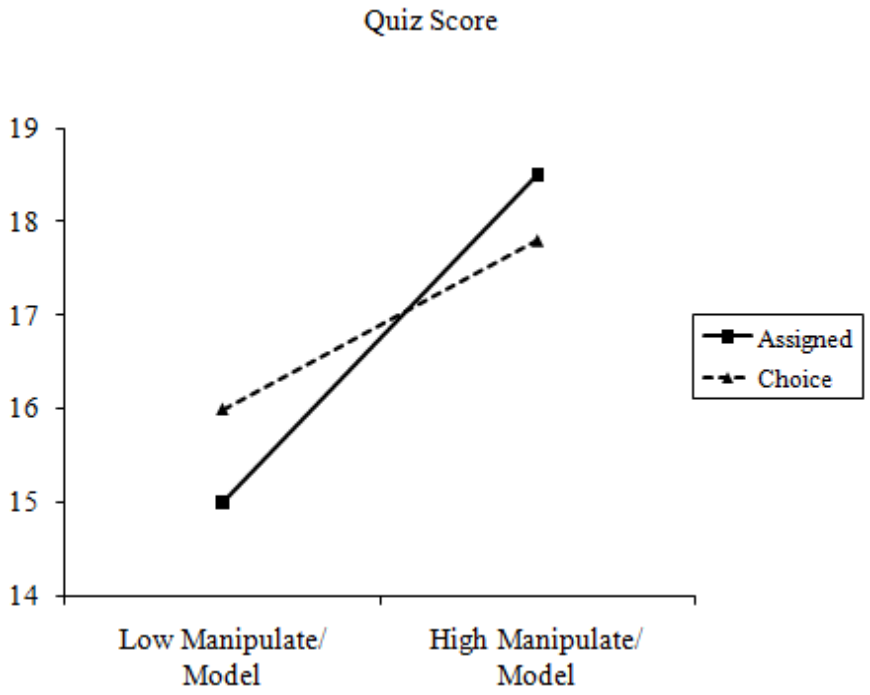

Figure 2. Interaction between degree manipulated/modeled examples/exercises and Assigned (personal and organizational) vs. Chosen (personal and organizational) contrast predicting quiz score. Predicted values for Quiz Score were generated for those one SD above and below the means of Manipulate/Model and using the weights associated with the Assigned v. Choice contrast.

Interest

When Lesson Interest was regressed on the Replication Contrasts plus Engagement Behaviors model, the overall model was significant ($F(11, 142) = 6.02$, $p = .00$, $R^2 = .32$). Similar to results found in the previous study, degree of manipulating/modeling the sample HTML code significantly and positively predicted interest at the end of the lesson ($t(142) = 5.17$, $p = .00$, $b = .14$, $SE = .03$). There was also a significant interaction between degree accessed and the Personal (assigned) vs. Organizational (assigned) contrast ($t(142) = -2.43$, $p = .02$, $b = -.17$, $SE = .07$), suggesting that simply accessing the examples and exercises positively

predicted lesson interest primarily when participants were assigned to the organizational framing condition (see Figure 3).

When Lesson Interest was regressed on the Choice and Value Type Contrasts plus Engagement Behaviors model, the overall model was significant ($F(11, 142) = 6.40$, $p = .00$, $R^2 = .33$). Similar to the first model, degree manipulated/modeled significantly and positively predicted interest at the end of the lesson.

There was also a new significant interaction effect between the Assigned v. Chosen contrast and the Personal (assigned and chosen) v. Organizational (assigned and chosen) contrast ($t(142) = 2.07$, $p = .04$, $b = .907$, $SE = .438$) that emerged only

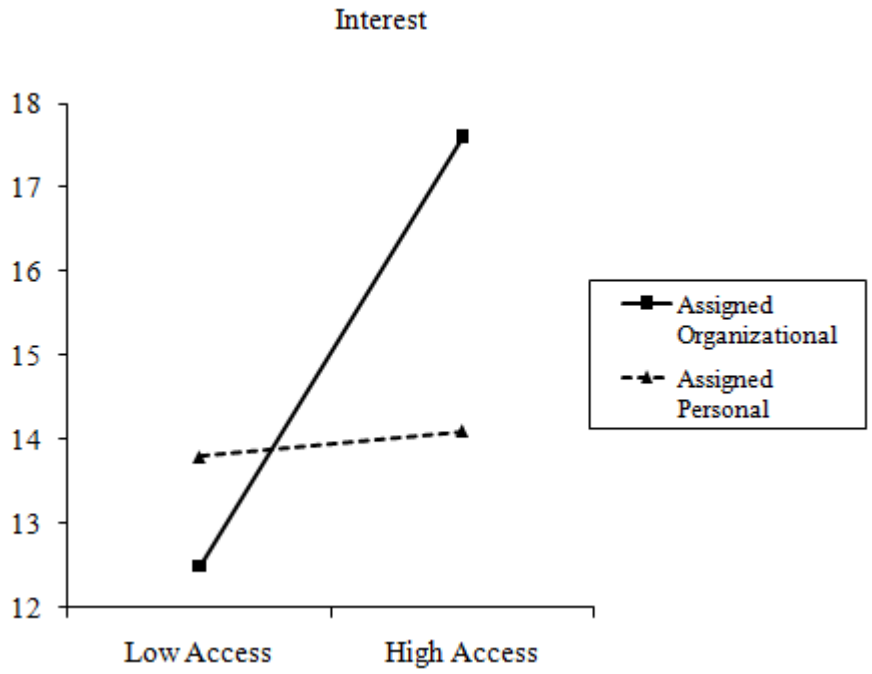

Figure 3. Interaction between degree accessed examples/exercises and Personal (assigned) vs. Organizational (assigned) contrast predicting post lesson interest. Predicted values for Interest were generated for those one SD above and below the means of Access and using the weights associated with the Personal (assigned) vs. Organizational (assigned) contrast.

when engagement behaviors were included in the model. This effect suggests that participants who chose to work with organizationally oriented examples and exercises reported significantly less interest in the lesson than participants who were assigned to work with the same examples and exercises. Comparatively, it did not seem to matter for interest whether participants chose or were assigned to work with personally oriented examples and exercises (Figure 4).

Additionally there was a significant interaction between the Assigned v. Chosen contrast and Degree Manipulated/Modeled ($t(142) = -2.04$, $p = .04$, $b = -.07$, $SE = .03$), suggesting that choice had a negative effect on individuals who

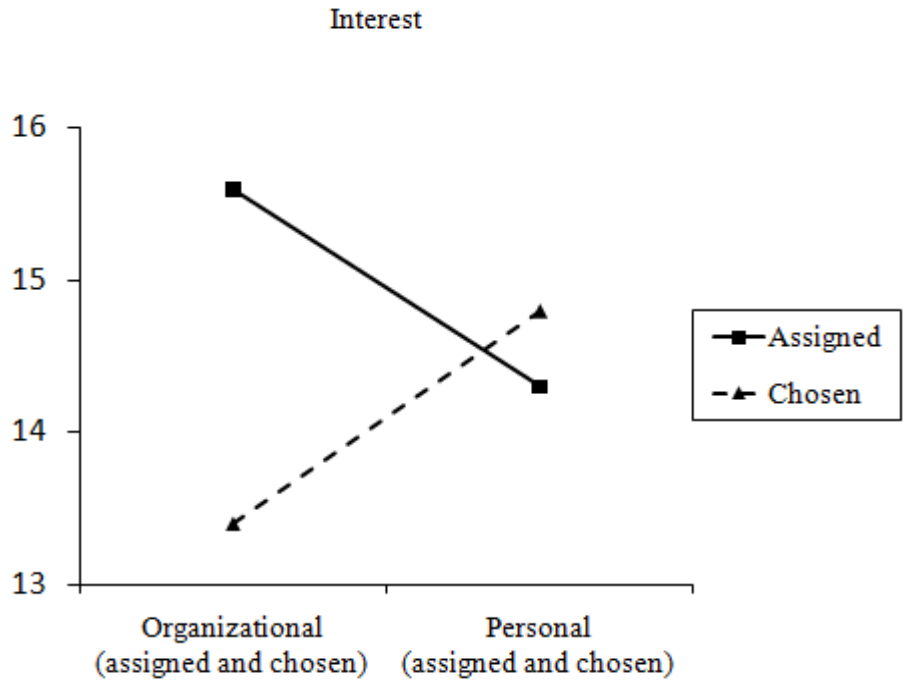

Figure 4. Interaction between Personal vs. Organizational and Assigned vs. Chosen contrasts predicting post lesson interest. Predicted values for Interest were generated using the weights associated with the Assigned vs. Chosen contrast and the Personal vs. Organizational contrast.

manipulated/modeled the sample HTML codes to a greater degree. At low levels of manipulated/modeled, in contrast, individuals who had choice tended to report greater interest than individuals in the assigned conditions (see Figure 5).

This finding paired with the same interaction predicting quiz score suggest that at high levels of engagement, choice was positively associated with quiz score (although not as positive as being assigned to the condition) and negatively associated with interest. The negative effects on interest associated with choice that emerged only with higher levels of engagement with the examples and exercises

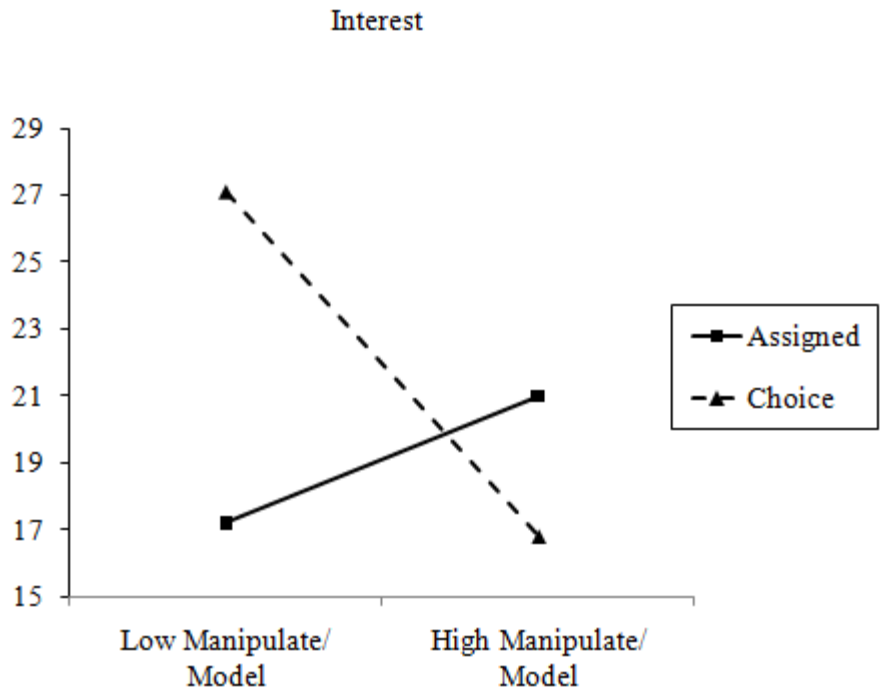

Figure 5. Interaction between degree manipulated/modeled examples/exercises and Assigned (personal and organizational) vs. Chosen (personal and organizational) contrast predicting interest. Predicted values for Interest were generated for those one SD above and below the means of Manipulate/Model and using the weights associated with the Assigned v. Choice contrast.

suggest that having choice may have unintentionally created a different experience when engaging more fully with the examples and exercise.

Alternative models.

Due to the partial failure of randomization reported earlier, it was important to consider how higher levels of interest in building personal web pages found in the neutral condition might influence any effects (or lack thereof) of the Value vs. No Value added contrast. Therefore, I also tested an alternative model where I added to the Replication Contrasts model participants' ratings of how interested they were in using HTML programming for creating personal web pages. This alternative model did not produce any different findings and therefore will not be discussed further.

Because participants entered into this study with different levels of previous experience with HTML and computer programming, as well as different levels of individual interest in applications for HTML programming, these individual differences may directly influence participants' higher level engagement behaviors, as well as lesson interest or quiz score, and could suppress any condition effects. Fraughton, et al., (in press) found that participants who had some prior experience with HTML programming did not manipulate/model the sample HTML code as much as those who had no prior experience. Although this effect was not found in the present study, I still tested alternative models where I added to the two contrasts models participants' ratings of how interesting as well as how important they thought it would be to learn HTML programming for personal as well as organizational web pages, and their previous experience with HTML programming and computer

programming in general. These alternative models did not produce any different findings, and so will not be discussed further.

DISCUSSION

This study was conducted in order to test two sets of hypotheses. The first set involved replicating previously found results of Sansone, et al. (2010), and suggested that participants assigned to the utility added conditions (personally or organizationally framed examples and exercises) would engage the examples and exercise at a higher level than those assigned to work with the neutrally framed examples and exercises, and thus show higher interest and learning at the end of the lesson. Additionally the possibility was presented that participants assigned to work with organizationally compared to personally framed examples and exercises may show different patterns of engagement, and consequently different levels of interest and learning. The second set involved identifying whether participants who were allowed to choose which examples and exercises they wanted to work with would become behaviorally engaged at a higher level than participants who were assigned to the same sets of examples and exercises, and whether this depended on the type of application illustrated (personal or organizational web pages). Finally, I predicted that higher levels of engagement with the examples and exercises would lead to greater interest in the lesson and better performance on the quiz. For these predictions, evidence was found which suggested that choice moderated the effect of value type on interest, but not in the predicted direction and only when engagement behaviors were controlled. In addition, higher levels of engagement behavior were

positively related to interest and learning outcomes, although a significant interaction with choice qualified this conclusion. No evidence was found that supported any of the other hypotheses.

It appears that manipulating the utility value information of learning HTML programming by framing the examples and exercises in terms of either being applicable to building a personal webpage or an organization's webpage did not have the same effects on lesson engagement behaviors as initially framing the lesson in terms of the utility value orientations. As the SRM model and the initial study by Sansone, et al. (2010) suggest, it is this higher level of engagement that should cause students to enjoy a more interesting experience while working on the lesson, and so it is not surprising that the manipulation of utility value in this study was not related to interest at the end of the lesson (as it was not predictive of engagement behaviors). Additionally, Sansone, et al. (2010) found that higher levels of engagement brought on by the addition of utility value resulted in better quiz score. Although higher levels of engagement were related to higher quiz scores in the present study, the manipulation of utility value was not.

One possible reason that this manipulation of utility value failed to influence lesson engagement behaviors could involve the initial manipulation's failure to produce greater anticipation of lesson usefulness. Participants were simply told that the examples and exercises would be useful for creating web pages in general, or different types of web pages, but they were not given any specific examples of what they might be able to do with what they learned (compared to Sansone, et al., 2010). Because participants in the value added conditions did not anticipate that the lesson

would be more useful than those in the neutral condition, these similar expectations might have led to similar engagement behaviors.

Another explanation for the lack of greater engagement behavior in the value added conditions could be that participants' may not have been able to see how the specific situations to which the examples and exercises were applied could be applied to their own lives (either personal or professional).In the initial study by Sansone, et al. (2010), examples and exercises were neutrally framed so that participants would have to make their own connections between the specific skills taught and how they could be used to build a personal or an organizational webpage, and piloting indicated that these examples and exercises were indeed seen as potentially applicable to either domain. However, in this study, examples and exercises were framed in ways that illustrated explicit uses for HTML skills in building personal *or* organizational web pages (e.g., showed how to create a table specifically for organizing your personal wish list of technological gadgets). It is possible that these specific examples restricted participants' ideas of what HTML could be applied to, and thus these sorts of applications did not induce higher levels of engagement than the neutrally framed examples and exercises.

Whether or not participants chose or were assigned to work with specific examples and exercises did not appear to affect engagement with the examples and exercises. One possible reason for this finding might again lie in participants' expectations for the lesson. Initial measures of how interesting and useful learning HTML programming would be showed that there was not a significant difference in either measure between participants who knew the lesson would contain applications

for personal web pages or organizational web pages. Additionally, means for both of these measures were only slightly above the midpoints of the interest and usefulness scales, indicating that participants weren't all that interested in learning HTML for either domain. Thus, giving participants a choice of which material did not really matter in terms of how they engaged the lesson because neither application was very interesting or useful for them to learn. This explanation parallels the work of Deci and Ryan's (1985) Self-Determination Theory, which suggests that autonomy is an important factor influencing intrinsic motivation. Although in many cases being given a choice between two options facilitates autonomous feelings, given a choice between two unattractive options may fail to produce feelings of autonomy, subsequently failing to lead to increased intrinsic motivation. Participants in the current study who were allowed to choose which examples and exercises to work with did not report greater feelings of autonomy compared to participants who were assigned, suggesting that in this study, choice did not lead to greater feelings of autonomy.

Participants who were allowed to choose which examples and exercises to work with did seem to experience less interest when they chose to work with examples and exercises which demonstrated organizational applications (compared to those who chose personal or were assigned to either domain). However, this effect only surfaced once participants' engagement behaviors were included in the model, suggesting that engagement with examples and exercises is related to interest, and that only when this effect is controlled for do the effects of choice emerge.

It is unclear what is driving this particular effect, but one possibility could involve controlling for the relationship between choice and level of manipulate/model predicting interest. Because interest for those in the choice conditions was significantly affected by the amount of manipulating/modeling participants did, this effect may have suppressed the interaction effect between choice and value type. When both interactions were included in the model, we were able to see the interaction between choice and value type predicting interest. This explanation, however, still does not explain why those who chose the organizational examples and exercises found the lesson less interesting than those in the other assigned and chosen conditions.

Similar to findings by Sansone, et al. (2010), higher levels of engagement with the examples and exercises led to greater interest and higher quiz scores. Additionally, the current study found that greater amounts of simply accessing the examples and exercises had a positive effect on interest for participants assigned to the organizational condition, however no such effects were found for participants assigned to the personal condition. Clues as to why this boost in interest occurred only for participants assigned to the organizational condition might be found in the initial piloting of our examples and exercises. These data suggested the possibility that the organizational examples and exercises might have seemed more applicable to creating a webpage for an organization than the personal examples and exercises seemed to creating a personal webpage. However, this interaction between behavioral engagement and condition only occurred at the lowest level of engagement, suggesting that if participants assigned to the personal condition

continued on to higher levels of engagement with the examples and exercises, the higher level of engagement might have been enough to counter the negative effect on interest.

Although it was true that overall greater amounts of manipulating/modeling the sample HTML code led to higher scores on the quiz at the end of the lesson, this effect was particularly true for participants who were assigned which examples and exercises they worked with, compared to those who were allowed to choose which examples and exercises they worked with. The effect that greater amounts of manipulating/modeling had on interest was also moderated by whether participants chose or were assigned which examples and exercises to work with, such that choice had a negative effect on interest at high levels of manipulating/modeling, but a positive effect at low levels of manipulating/modeling. Taken together these results suggest that at the highest level of engagement, being allowed to choose which examples and exercises to work with had a positive effect on quiz score, but a negative effect on interest. One explanation for these findings is that giving participants the opportunity to choose which examples and exercises they were going to work with could have made participants more aware of the importance of using HTLM programming in the specific domains they chose the examples and exercises to represent. Thus if participants were let down by the content of the examples and exercises (e.g., reported less interest), they were still able to focus on the HTML skills that were taught in the lesson. Data collected after participants chose which examples and exercises they would like to work with that assessed how important

participants thought it would be to learn the material taught in the lesson do not appear to support this explanation, however.

These results suggest that providing students with examples containing very specific applications for HTML programming may lead them to believe that the information is not applicable to their individual interests and/or needs. By limiting the generalizability of HTML programming, these manipulations may have inhibited greater amounts of engagement with the examples and exercises, compared to those seen in the value added conditions of Sansone, et al. (2010). Additionally, while providing students the opportunity to choose which types of examples and exercises to use may not have affected engagement behaviors, it did seem to have an effect on the experience participants had while engaging the examples and exercises at the highest level.

Finally, we were able to replicate the results from Sansone, et al. (2010) concerning the relationship between engagement behaviors and interest and performance. It seems that overall, the content of the examples and exercises did not moderate the positive effect that higher levels of engagement had on interest and performance.

Limitations

Although we have tested the framing of examples and exercises within specific utility value domains in the lab, we do not know if these findings (or lack of) would generalize to a real online course, where students would spend the entire semester working with a greater variety of examples and exercises. For example, our study only employed 10 specific applications (for each domain), whereas in an entire

semester long course, a student might encounter different examples and exercises that might be more applicable to their individual interest and/or needs. If this were the case, then we may not have had a large enough variety of specific examples and exercises to fit participants' needs for HTML programming.

Although this study explores how students' choices about what types of examples and exercises they are exposed to might affect engagement behaviors, as well as lesson interest and performance, this experimental design limits our ability to discuss the effects of choice in itself. In the choice conditions participants not only were able to make a choice, but they also experienced the effects of their choices (in terms of the different example/exercise content). We were, however, able to compare conditions where participants chose which type of examples and exercises they wished to work with to conditions where participants were assigned to the same examples and exercises, and this gave us a little more latitude to discuss the effects of choice in and of itself. Additionally, although initial piloting of which types of examples and exercises participants would choose to work with suggested that organizational examples and exercises would be chosen more often than personal examples and exercises, this was not the case in the main study. Of the 43 participants assigned to the choice condition, 63% chose to work with personal examples and exercises. Given that the pilot and main studies sampled from the same population, it is possible that the differences across sample reflects that the choice is not based on strong preferences in this population. As noted previously, choice may be less important as a factor when individuals do not have strong preferences for one choice over another. Although this study was only an initial attempt to consider the

role of students' choices of learning material in online courses, the question still requires further attention.

Finally, we must take into account the laboratory setting in which this study took place. Although we would like to be able to say that the participants in our study are identical to students in an online class, we are aware that this is not the case. However, by utilizing the laboratory setting, we are able to talk about potential causal effects of manipulating the utility value of a lesson and choice, something we would not be able to do in a classroom setting due to ethical concerns (e.g., if we had reason to suspect that altering the material would have effects on student grades, we could not only expose some students to the new material and not others). Further, we would not be able to measure what students actually did while going through their lessons, only self-reports of what they did. Although we acknowledge these tradeoffs, we feel that the present study provides important information that we can eventually apply to an actual online course.

Future directions

In the study by Sansone, et al. (2010), participants in the value added conditions were provided with some ideas for how the material learned in the lesson could either be used for building a personal or an organizational webpage, and then were given neutral examples and exercises. This manipulation of utility value led to participants in the value added conditions having greater expectations for the usefulness of the examples and exercises. In the current study, participants were not provided with these ideas in the introduction to the lesson, but they were illustrated in the examples and exercises. Although participants were told that the examples and

exercises would illustrate different utilities of HTML programming, this description did not lead to greater expectations of utility value. Participants in these conditions did not have greater expectations for usefulness than participants in the neutral condition.

It is possible that a combination of the two manipulations (i.e., providing initial ideas about the utility of HTML programming *and* illustrating these ideas in the examples and exercises) might yield stronger effects than those reported by Sansone, et al. (2010). This idea could be explored by using similar initial descriptions used in the Sansone, et al. (2010) study, and then matching the description to the examples and exercises that actually illustrate these possibilities. By comparing the results from this type of study to the results by Sansone, et al. (2010), we could determine whether or not it would be most beneficial for online classes to simply add descriptions of how course material could be useful in everyday life, or whether greater benefits could be found by actually changing the course content to match these initial descriptions.

If it is indeed the case that the specificity of the examples and exercises in this study make it difficult for participants to see how HTML programming could apply to their lives it would be important to test this possibility. A similar study could be run, but more detailed measures of participants' expectations could be assessed. After participants learn what types of examples and exercises they will be working with, questions could be asked assessing what participants hope to be able to do with the skills they learn from the lesson, and whether they think the applications illustrated in the examples and exercises will help them meet their goals.

Additionally, after the lesson is over, questions could be asked assessing how helpful they found the examples and exercises, whether they seemed applicable to the participants needs/interests, and whether or not they were perceived as being helpful for the specific domain they represented. These kinds of measures would allow us to determine what it was about the example/exercise content that failed to lead to greater engagement behaviors. It would also be possible to see how the expectations or goals change when participants were assigned vs. chosen into a condition, and how evaluations of the examples and exercises change as a function of behavioral engagement.

Another future direction would be to focus on individual differences as potential moderators of whether the framing of the exercises and examples is associated with differential engagement. For example, research suggests that students who are more mastery goal oriented engage tasks at a higher level (Ames, 1992), and it is possible that this would be particularly true if the framing matched the application they wished to master. Although there are a number of individual differences collected as part of the larger data set from which I am reporting, their examination is beyond the scope of the present paper. However, examining the role of individual differences is a goal for future research.

CONCLUSION

The present study replicated findings by Sansone, et al. (2010) that higher levels of engagement with examples and exercises lead to greater interest in the lesson and better performance on the quiz at the end of the lesson. Unlike Sansone, et al. (2010), we were not able to determine why participants engaged the examples and exercises differentially. The addition of utility value to the examples and exercises did not seem to affect engagement behaviors, nor did giving participants a choice of what examples and exercises to work with. Further, participants' expectations prior to the lesson did not predict engagement behaviors either. Based on the measures employed in this study, it is difficult to pinpoint exactly why participants different in their levels of engagement.

Although this study may not have yielded the predicted results, some important implications for designing online classes may be gleaned from its findings. First and foremost, it seems that trying to force students to relate to specific applications for HTML programming is not as beneficial (and is potentially detrimental) for lesson interest or performance, compared to providing students with application ideas, and then letting them make their own connections between lesson material and how it could be used in their own lives. Additionally, although the idea of being able to tailor lessons to individual's specific interests and needs is an attractive one for online course, the way in which course content reflects different

types of applications requires extensive consideration. It is possible that there might not be specific “cookie cutter” examples for applications that would work for everyone, even within the same application domain. Finally, although students taking online courses are faced with choices every step of the way (e.g., whether to work on a lesson now or later, whether or not to use the examples and exercises, etc), providing choices within the lesson pertaining to what lesson material students are exposed to might create a different expectations and experiences for the student, and may not always lead to more beneficial outcomes.

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